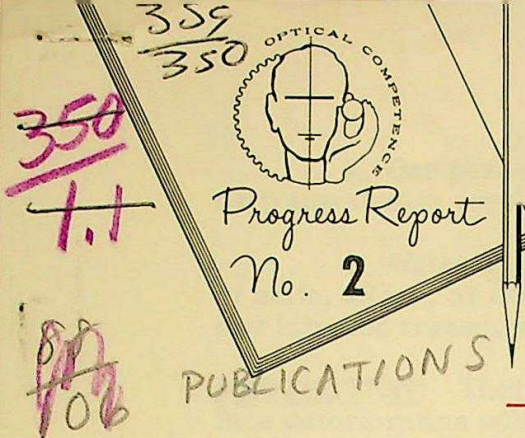




PUBLICATIONS

1958

INFRA-RED

BAUSCH & LOMB OPTICAL COMPANY • ROCHESTER 2, NEW YORK

June 16, 1958

SUBJECT: ADDITIONAL INFRARED TRANSMITTING GLASSES, RIR-2 and RIR-20

INTRODUCTION: Since the release of Progress Report No. 1, our Glass Research Group has given study to additional infrared transmitting glasses. Two new glasses have resulted, having characteristics which it is felt will be of considerable interest in this field. For the present, they are designated as RIR-2 and RIR-20.

As the types previously discussed, they are still in the research stage and have been produced so far in limited quantity. While development continues and may lead to possible change, the immediate release of available information may prove helpful to you.

FORM: RIR-2 may be treated as a normal optical glass. In addition to obtaining shapes cast directly from the melt, the more normal method of handling glass may be used for limited sizes and shapes. Reheating and moulding appears to be entirely feasible. Because of the high softening point, however, some special precautions should be taken. This glass has been melted in containers which have yielded substantially greater volumes than the 80 cubic inches for other infrared transmitting materials that have previously been described.

RIR-20 can probably be produced and treated in much the same manner as RIR-2. Composition-wise, however, it is a costly material in comparison with other glasses we have previously described. So far, experimental melts have been limited to about 80 cubic inches. However, a few actual tests on size, shape and handling techniques have been made. It is reasonable to believe that this glass can be made in the same sizes and shapes as the RIR-2.

DURABILITY:

RIR-2

1. One percent HNO_3 at 25°C - pH about 1.0 - A film forms after about 50 hours of exposure. This indicates a stain class of 2, which is moderately good and comparable to some of the better optical glasses.

2. Water Vapor - 120°F at 90-95% Relative Humidity. There is no indication of stain, attack, or deterioration after 24 hrs. exposure to these conditions. The visible and infrared transmission curves show no change over the entire range.

RIR-20

1. One percent HNO_3 at 25°C - pH about 1.0 - After 24 hrs. exposure there is some indication that the glass is dissolving in this media. However, there is no excessive deterioration even after 100 hrs. exposure.

DIVISION 7

DEC 16 1958

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2. One percent Calgon* at 25°C - pH about 6.7 - No deterioration in appearance or transmission after 150 hrs. exposure.

3. Water Vapor - 120 °F at 90-95% Relative Humidity - There is no indication of stain, attack, or deterioration after 24 hrs. exposure to these conditions. The visible and infrared transmission curves show no change over the entire range.

PROTECTION: There is no indication at the present time that protection against surface deterioration will be required for either of these glasses.

TRANSMISSION: The attached curves give visible and infrared transmission of both RIR-2 and RIR-20. For uniformity these curves are labeled as follows:

Visible and Infrared Transmission RIR-2

0.5mm
2.0mm
4.0mm

Visible and Infrared Transmission RIR-20

0.5mm
2.0mm
4.0mm

REFRACTIVE INDEX:

Wavelength-microns	Index of Refraction	
	RIR-2	RIR-20
0.4047	1.82800	1.91449
0.4341	1.81806	1.90155
0.4359	1.81746	1.90082
0.4861	1.80536	1.88529
0.5461	1.79558	1.87274
0.5876	1.79060	1.86639
0.5893	1.79041	1.86616
0.6563	1.78443	1.85866
1.0140	1.76988	1.84044
1.1287	1.76741	1.83762
1.3620	1.76343	1.83333
1.5295	1.76104	1.83000
1.6606	1.75920	1.82909
1.8131	1.75718	1.82722
1.9701	1.75503	1.82527
2.1526	1.75238	1.82290
2.2493	1.75103	1.82183
2.3254	1.74984	1.82073
2.4374	1.74806	1.81924
2.577	1.74582	1.81732

*Tradename Calgon Inc., Sodium hexametaphosphate

SURFACING: Both of these glasses can be worked by conventional methods used for optical glasses.

USE: Both glasses can be generally recommended for use in IR domes, windows and interference filter substrate material.

AVAILABILITY AND QUOTATION: RIR-2 can be produced from both laboratory and production facilities.

RIR-20 is presently limited to laboratory processes although it is expected that it will lend itself to larger scale production if desired.

It may be generally stated that for a given physical dimension, RIR-2 is slightly more costly than RIR-10, RIR-11 or RIR-12. Because of its composition, Type RIR-20 is several times more costly than RIR-2.

Should you desire a quotation we will endeavor to give your inquiry prompt and careful attention. Physical dimensions, type and quantity are necessary specifications and it should be stated whether the components are to be in rough or in finished form.

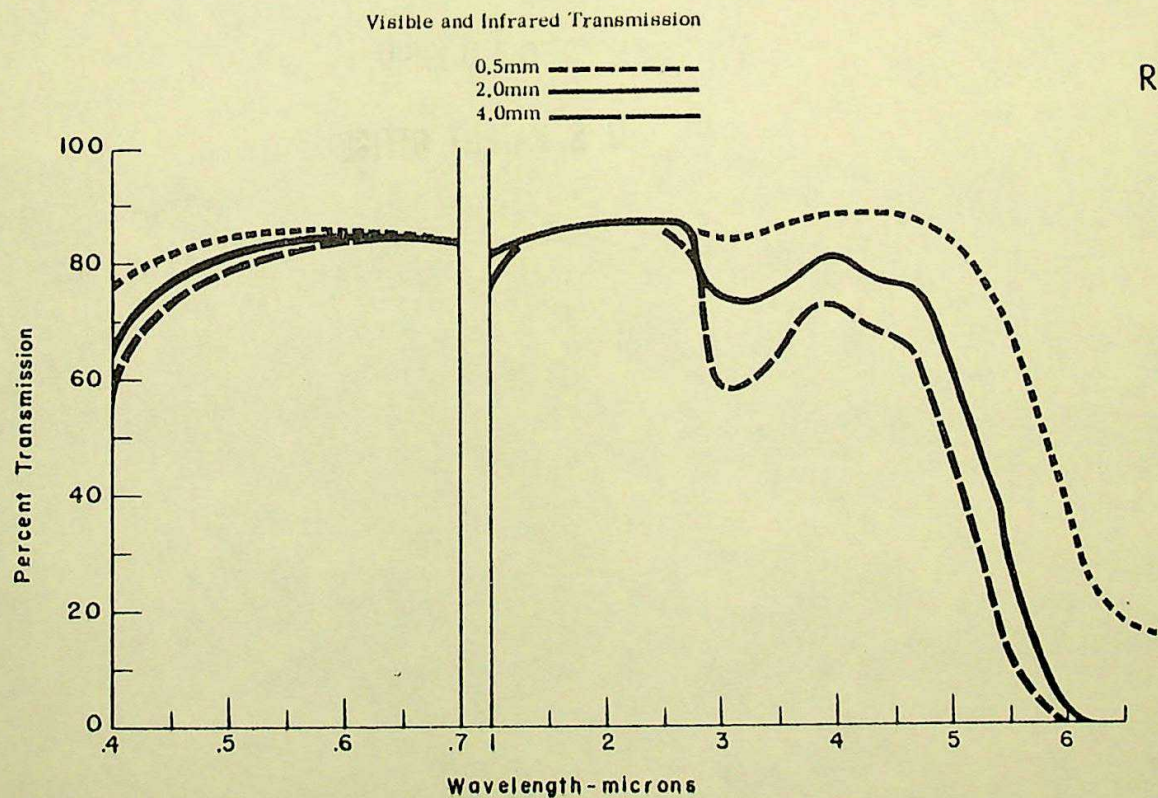
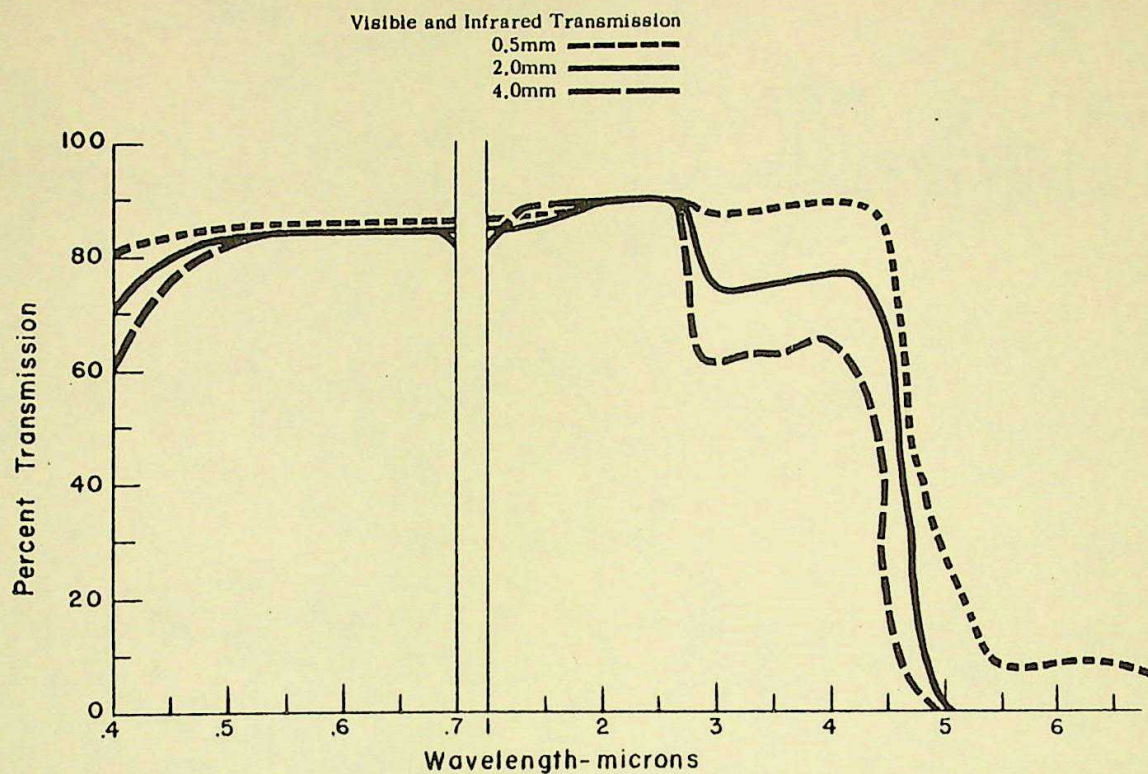
SUMMARY: The addition of RIR-2 and RIR-20 glasses to those previously described in Progress Report No. 1 extends the selection of materials for infrared use. The glass chosen will depend largely on the use to be made of it. To assist you in this selection the following comparison is made:

Glass Type	RIR-2	RIR-10 RIR-11 RIR-12	RIR-20
Form	Molded or Cast	Cast only	Molded or Cast
Average Melt Yield	Up to 100 lbs.	Up to 10 lbs.	Over 10 lbs.
Durability	No protection required	Protection required	No protection expected
Cost	Slightly greater than RIR-10, 11, 12	Lowest	Several Times RIR-2

Wavelength in Microns	Average Percent Transmittance for 2mm thickness				
	RIR-2	RIR-10	RIR-11	RIR-12	RIR-20
.4	66	2	0	0	67
.7	85	68	47	59	83
1.0	85	79	72	79	83
Max. between 2.0 & 2.75	90	91	92	93	88
Min. between 2.75 & 3.2*	75	50	52	56	72
Max. between 3.75 & 4.5	78	82	84	88	80
Cut-off Wavelength in Microns at 2mm thickness	4.9	5.75	6	5.75	6

*Water Band

RIR 2



RIR 20

DIVISION 7

DEC 16 1958

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